

**Emergency shut-down process for pressurized electrolysis process minimizes the dangers arising from high pressures and hydrogen gas**

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**Abstract of DE19901884**

An emergency shut-down procedure for a pressurized electrolysis process which has a hydrogen/caustic separator and an oxygen/caustic separator which are linked by a pipe. The hydrogen released from the hydrogen/caustic separator, and the oxygen contained in the oxygen/caustic separator, are de-pressurized at essentially the same time, leaving the caustic levels unchanged. The process also prevents the sudden movement of a gas from one separator to the other. Also claimed is a process for the automatic supply of an inert medium to purge residual hydrogen when a pre-determined low pressure has been reached.

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## In English:

The invention concerns a procedure for the emergency shut-down of an electrolysis plant, in particular a pressure electrolysis plant, whereby the electrolysis plant exhibits at least one hydrogen/caustic solution separator and an oxygen/caustic solution separator, and these are connected by at least a communicating line. In the article "concept of a high achievement electrolysis" from LIME TREE REPORT FROM TECHNOLOGY AND SCIENCE, 66/1991, page 50 to 54, is described a pressure electrolysis plant with their substantial construction units. The main danger potential of a such plant in the case of an emergency shut-down is the hydrogen in the hydrogen caustic solution separator: on the one hand hydrogen is a combustible gas, on the other hand is it at a increased pressure - bspw. 30 bar -, which "reproduces itself" in all components, and thus into those, which are filled with hot caustic solution. Beyond that the landing on water often/caustic solution separator and the oxygen/caustic solution separator are process-determined connected by a communicating line, whereby with uneven withdrawal of hydrogen and/or oxygen an estimate can occur into that in each case different separator and develop a highly explosive hydrogen/oxygen mixture. The emergency shut-down of (Druck)Elektrolyseanlagen takes place so far by means of a pressure flushing with nitrogen. A such procedure is meaningful however only with comparatively small plants, since it requires an accordingly large nitrogen thrust bearings and in addition with itself brings a high nitrogen consumption. Besides procedures are well-known, with which the individual components are from each other partitioned by rapid-action valves. These procedures involve however a multiplicity of subsequent problems, like bspw. high technical expenditure, back mixture of hydrogen and oxygen in the caustic solution entrance channel of the cell block as well as mixture of hydrogen and oxygen over cell wall diffusion. Task of the available invention is it, a

procedure for the emergency shut-down of electrolysis plants to indicate in particular from pressure electrolysis plants which the disadvantages mentioned avoids, thus for all plant sizes be used can and besides none of the above-mentioned subsequent problems exhibits. This is reached according to invention by the fact that into hydrogen/caustic solution separators are essentially at the same time eased contained hydrogen from the hydrogen/caustic solution separator and the oxygen from the oxygen caustic solution separator, contained in the sow first often/caustic solution separator, whereby the caustic solution conditions remain in substantially unchanged in the separators. With the procedure according to invention for the emergency shut-down a controlled relaxation, which is accomplished preferably automatically, is made possible for an electrolysis plant the hydrogen from the hydrogen/caustic solution separator, which is at pressure. Thus the above-mentioned danger potential is substantially reduced within a comparatively short period. The relaxed hydrogen is preferably transferred here, according to a favourable arrangement of the procedure according to invention, to the atmosphere. At the same time the oxygen is delivered over a further automatically regulated valve system likewise controlled to the atmosphere, so that an estimate is in reverse excluded from hydrogen into the oxygen and. The procedure according to invention training further is suggested that the hydrogen/caustic solution separator with an inert medium, preferably with nitrogen or a nitrogen-containing mixture, is filled and/or rinsed. By the term "inert medium" is to be understood both a Gas (gemisch) and in (E) Flüssigkeits(gemisch). Preferably filling and/or flushing hydrogen/caustic solution of the separator with an inert medium take place however only then, if the hydrogen/caustic solution separator is essentially pressure-free, thus for example a pressure from 3 bar reached are. This process step is accomplished again preferably automatically. The hydrogen/caustic solution separator is inertisiert by this feed of an inert medium. By means of this process step can besides effectively an in and/or sucking in air and/or an oxygen over the Ausblasleitung(en) are prevented and to be able besides the mentioned danger potentials are completely eliminated. The procedure according to invention is suitable evidently to all plant sizes. Nitrogen consumption is - if a feed is at all

intended into the hydrogen/caustic solution separator - comparatively small. For the realization of the procedure according to invention as well as its arrangements of needed regulating valves can be controlled comparatively simply concerning their operability as well as the optimal position with beginning of the relaxation. So that a redundancy is ensured, it is advisable to plan the necessary regulating valves doubly.

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Die Erfindung betrifft ein Verfahren zur Notabschaltung einer Elektrolyseanlage, insbesondere einer Druckelektrolyseanlage, wobei die Elektrolyseanlage wenigstens einen Wasserstoff/Lauge-Abscheider und einen Sauerstoff/Lauge-Abscheider aufweist, und

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## In English:

1. Procedures for the emergency shut-down of an electrolysis plant, in particular a pressure electrolysis plant, whereby the electrolysis plant exhibits at least one hydrogen/caustic solution separator and an oxygen/caustic solution separator, and these connected by at least a communicating line are characterized, by the fact that the hydrogen from the hydrogen/caustic solution separator, contained in the landing on water often/caustic solution separator, and the oxygen from oxygen/caustic solution the separator, contained in the oxygen/caustic solution separator, are essentially at the same time eased, whereby the caustic solution conditions remain in substantially unchanged in the separators. 2.

Procedure for the emergency shut-down of an electrolysis plant according to requirement 1, by the fact characterized that the hydrogen/caustic solution separator with an inert medium, preferably with nitrogen or a nitrogen-containing mixture, is filled and/or rinsed. 3. Procedure for the emergency shut-down of an electrolysis plant according to requirement 2, by the fact characterized that filling and/or flushing hydrogen/caustic solution of the separator with one take place Inertmedium only then if the hydrogen is essentially pressure-free caustic solution separator. 4. Procedure for the emergency shut-down of an electrolysis plant after one of the preceding requirements, by the fact characterized that the relaxed hydrogen is exhausted to the atmosphere. 5. Procedure for the emergency shut-down of an electrolysis plant after one of the preceding requirements, by the fact characterized that the mechanisms, as for example measuring circles, needed for the relaxation, are redundantly implemented automatic controller, valves, etc.. 6.

Procedure for the emergency shut-down of an electrolysis inquiry after one of the preceding requirements, by the fact characterized that during the relaxation all other gas-exhausting lines are closed. 7. Procedure for the emergency shut-down of an electrolysis plant after one of the preceding

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requirements, by the fact characterized that the relaxation takes place automatically regulated, preferably via error-proof liquid condition regulations in the separators. 8. Procedure for the emergency shut-down of an electrolysis plant after one of the preceding requirements, by the fact characterized that the relaxation takes place in a short period, whereby these preferably less than 10 min. amounts to.

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. Verfahren zur Notabschaltung einer Elektrolyseanlage, insbesondere einer Druckelektrolyseanlage, wobei die Elektrolyseanlage wenigstens einen Wasserstoff/Lauge-Abscheider und einen Sauerstoff/Lauge-Abscheider aufweist, und

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